CLAIMS

1. A wind turbine blade comprising

- one or more shape deformable airfoils sections wherein the outer surface of each of the shape deformable airfoils sections is substantial continuos in all of its shapes, and
- actuator means for providing the shape changes in the shape deformable airfoil sections.

2. A wind turbine blade according to claim 1, wherein the actuator means are(is) active means in the sense that they(it) provide(s) changes in shape by supplying them(it) with energy.

3. A wind turbine blade according to claim 1 or 2, wherein each shape deformable airfoil section comprising a substantially non-deformable part and one or more deformable parts.

4. A wind turbine blade according to claim 3, wherein, the outer surface of at least one of the deformable parts is defined by a skin made of a flexible material, e.g. rubber.

5. A wind turbine blade according to claim 4, wherein at least one of the deformable parts is a shell construction in which the skin defined the shell.

6. A wind turbine blade according to claim 5, wherein the interior of the shell construction is occupied by a deformable supporting material, such as a foam made of plastic or rubber.

7. A wind turbine blade according to any of the claims 4-6, wherein the transition between the outer surface of substantially non-deformable part and the skin of the deformable parts is substantially smooth, such as substantial continuous.

8. A wind turbine blade according to any of the claims 4-8, wherein the non-deformable part comprising abutment surfaces on which the skin abuts, the abutment surfaces being shaped so that the transition between the outer surface of the substantial non-deformable part and the skin is substantially smooth, such as substantial continuous.

9. A wind turbine blade according to any of the claims 4-8, wherein the actuator means acts(act) on the inner side of the skin.

10. A wind turbine blade according to any of the claims 4-9, wherein the actuator means is(are) a longitudinal extendable device(s), preferably being a hydraulic device, having one end connected to the skin and the other end connected to the substantially non-deformable part or a structure connected to the substantially non-deformable part.

11. A wind turbine blade according claim 10, wherein the longitudinal extendable device at one end being attached to in the vicinity of either the upper or lower side of the airfoil.

12. A wind turbine blade according to claim 10 or 11, wherein the longitudinal extendable device(s) extends mainly in the cordwice direction and wherein the end being connected to said skin is connected to the skin at the lower side of the airfoil and the end being connected to the substantially non-deformable part or the structure is connected in the vicinity of the upper side of the airfoil or vice versa.

13. A wind turbine blade according to any of the claims 10-12, wherein the longitudinal extendable device(s) is(are) an extendable piston device.

14. A wind turbine blade according to any of the claims 4-8, wherein the skin is attached to the substantially non-deformable part and wherein the actuator means is situated within the skin.

15. A wind turbine blade according to claim 14, wherein the actuator means is(are) material composition(s) which elongation(s), shortening(s) and/or bending(s) is(are) controllable by applied electrical current(s), e.g. being a smart material.

16. A wind turbine blade according to claim 15, wherein the material composition is sandwiched or embedded in the skin, preferably in such a manner that no slip between the material composition and the material of the skin occurs during deformation of the skin.

17. A wind turbine blade according to claim 15 or 16, wherein the material composition is applied to the interior surface of the skin, preferably in such a manner that no slip between the material composition and the material of the skin occurs during deformation of the skin.

18. A wind turbine blade according to claim 3, wherein at least one of the shape deformable parts is made of flexible material(s), e.g. rubber, and wherein the actuator means is(are) an extendable beam(s) extending within the material(s).

19. A wind turbine blade according to claim 18, wherein the at least one deformable part is made solely of flexible material(s) and has one or more voids.

20. A wind turbine blade according to claim 18 or 19, wherein the extendable beam(s) is made from a material composition which elongation(s), shortening(s) and/or bending(s) is(are) controllable by applied electrical current(s), such as made from a smart material.

21. A wind turbine blade according to claim 1, wherein the actuator means are(is) passive in the sense that they provide(s) changes in shape as a result of movement of the blade, said movement being preferably torsion, bending and/or rotation of the blades.

22. A wind turbine blade according to any of the preceding claims, wherein the substantially non-deformable part is a central part of the blade and wherein the one or more deformable parts are the leading edge region and/or the trailing edge region.

23. A wind turbine blade according to any of the claims 1-22, wherein the substantially non-deformable part is a load carrying part.

24. A wind turbine having one or more wind turbine blades according to any of the claims 1-23

25. A method of controlling the operation condition(s) of a wind turbine comprising one or more blades each having one or more shape deformable airfoil sections, said operation condition(s) being preferably the load on the blade(s), the power produced by the wind turbine, air induced noise, the stability of the wind turbine and/or the like; said method comprises controlling the shape of the shape deformable airfoil sections, wherein the changes in shape are performed so that no discontinuities are introduced in the surfaces of the airfoils sections.

26. A method according to claim 25, wherein each or some of the shape deformable airfoil sections comprise one or more of the features according to any of the claims 1-24.

27. A method according to claim 25 or 26, wherein the wind turbine comprises detecting means for detecting the one or more operation(s) conditions, wherein the detected operation condition(s) is(are) input to a computer system comprising functionality determining shape deformations to be imposed on some or all of the deformable airfoil sections based on said input.

28. A method according to claim 27, wherein the detecting means comprising means for measuring the blade flow pressure, the rotor position and/or strain gauges, accelerometers or the like provided on one or more components of the wind turbine, said components being typically and preferably the blade(s), the nacelle and/or the tower.

29. A method according to any of the claims 25-28, wherein a typical time scale for a deformation to be introduced in the deformable airfoil sections, is lower than the time for one rotor rotation, preferably lower than half the time for one rotor rotation, such as lower than one quarter for the time for one rotor rotation, such as lower than the time it takes for a blade to rotate 10°, such as 15°.

30. A method according to any of the claims 25-29, further comprising the step setting and/or altering the full span pitch of each blade.